

CLAIMS

1. A support system for supporting a printing screen unit in a screen printing machine, the support system including a support assembly comprising:
a support unit for supporting a printing screen unit comprising a printing screen including printing apertures through which printing medium is printed onto a workpiece; and
a tensioning mechanism for tensioning the printing screen in a screen printing operation, wherein the tensioning mechanism is configured to tension the printing screen to a first tension in a printing phase in printing printing medium onto a workpiece and a second tension, which is lower than the first tension, in a separation phase in separating the printing screen unit and the workpiece.
2. The support system of claim 1, wherein the second tension is substantially a zero tension.
3. The support system of claim 1 or 2, wherein the tensioning mechanism comprises at least first and second tensioning units for tensioning the printing screen.
4. The support system of claim 3, wherein the tensioning units are configured to apply a tensioning force to opposite edges of the printing screen.
5. The support system of claim 3, wherein the tensioning units are configured to apply tensioning forces to adjacent corners of the printing screen.
6. The support system of claim 5, wherein the tensioning units are configured to apply the tensioning forces along intersecting axes.

7. The support system of claim 6, wherein the axes intersect at a center of the printing screen.
8. The support system of claim 3, wherein the tensioning mechanism comprises four tensioning units each for applying a tensioning force to a respective corner of the printing screen.
9. The support system of claim 8, wherein the tensioning units are configured to apply tensioning forces along intersecting axes.
10. The support system of claim 9, wherein the axes intersect at a center of the printing screen.
11. The support system of any of claims 1 to 10, wherein the support unit further comprises first and second screen guiding units for guiding the printing screen which are disposed to opposite edges of the printing screen.
12. The support system of claim 11, wherein the screen guiding units act to constrain deflection of the printing screen.
13. The support system of claim 11 or 12, wherein the screen guiding units are disposed to ends of the printing screen in the direction of screen printing.
14. The support system of claim 11 or 12, wherein the screen guiding units are disposed to sides of the printing screen in the direction of screen printing.
15. The support system of any of claims 1 to 14, wherein the support assembly further comprises:

- a clamping mechanism for clamping the printing screen in the printing phase so as to fix the lateral, in-plane position of the printing screen.
16. The support system of claim 15, wherein the clamping mechanism comprises first and second screen clamping units disposed to opposite edges of the printing screen.
 17. The support system of claim 16, wherein the screen clamping units are disposed to opposite ends of the printing screen in the direction of printing.
 18. The support system of claim 16, wherein the screen clamping units are disposed to opposite sides of the printing screen in the direction of printing.
 19. The support system of any of claims 16 to 18, wherein the screen clamping units comprise elongate units which extend along the respective ones of the edges of the printing screen.
 20. The support system of any of claims 16 to 19, wherein the screen clamping units comprise vacuum clamping units.
 21. The support system of any of claims 1 to 20, further comprising:
a printing screen unit, the printing screen unit including a pattern of apertures through which printing medium is printed onto a workpiece in a printing phase.
 22. The support system of claim 21, wherein the printing screen unit includes first and second attachment members attached to opposite edges of the printing screen.

23. The support system of claim 22, wherein the attachment members each extend along a length of the respective edge of the printing screen.
24. The support system of claim 22 or 23, wherein the attachment members are attached to opposite ends of the printing screen in the direction of screen printing.
25. The support system of claim 22 or 23, wherein the attachment members are attached to opposite sides of the printing screen in the direction of screen printing.
26. The support system of any of claims 21 to 25, wherein the printing screen unit includes first and second support elements disposed to opposed edges of the printing screen such as to constrain deflection of the printing screen.
27. The support system of claim 26, wherein the support elements each extend along a length of a respective edge of the printing screen.
28. The support system of claim 25 or 26, wherein the support elements are disposed to opposite ends of the printing screen in the direction of screen printing.
29. The support system of claim 25 or 26, wherein the support elements are disposed to opposite sides of the printing screen in the direction of screen printing.
30. A support system for supporting a printing screen unit, the support system including a support assembly comprising:
a support unit for supporting a printing screen unit, the printing screen unit comprising a printing screen including printing apertures through which printing medium is printed onto a workpiece; and

a clamping mechanism for clamping the printing screen in a printing phase in printing printing medium onto a workpiece so as to fix the lateral, in-plane position of the printing screen.

31. The support system of claim 30, wherein the support assembly further comprises:
a tensioning mechanism for tensioning the printing screen.
32. The support system of claim 31, wherein the tensioning mechanism is configured to tension the printing screen to one predetermined tension in a screen printing operation.
33. The support system of claim 31, wherein the tensioning mechanism is configured to tension the printing screen to a first tension in a printing phase in printing printing medium onto a workpiece, and a second tension, which is lower than the first tension, in a separation phase in separating the printing screen unit and a workpiece.
34. The support system of claim 33, wherein the second tension is substantially a zero tension.
35. The support system of any of claims 32 to 34, wherein the tensioning mechanism comprises at least first and second tensioning units for tensioning the printing screen.
36. The support system of claim 35, wherein the tensioning units are configured to apply a tensioning force to opposite edges of the printing screen.
37. The support system of claim 35, wherein the tensioning units are configured to apply tensioning forces to adjacent corners of the printing screen.

38. The support system of claim 37, wherein the tensioning units are configured to apply the tensioning forces along intersecting axes.
39. The support system of claim 38, wherein the axes intersect at a center of the printing screen.
40. The support system of claim 35, wherein the tensioning mechanism comprises four tensioning units each for applying a tensioning force to a respective corner of the printing screen.
41. The support system of claim 40, wherein the tensioning units are configured to apply tensioning forces along intersecting axes.
42. The support system of claim 41, wherein the axes intersect at a center of the printing screen.
43. The support system of claim 30, wherein the printing screen unit comprises a screen frame to which the printing screen is tensioned to one predetermined tension.
44. The support system of claim 30 to 43, wherein the support unit further comprises first and second screen guiding units for guiding the printing screen which are disposed to opposite edges of the printing screen.
45. The support system of claim 44, wherein the screen guiding units act to constrain deflection of the printing screen.
46. The support system of claim 44 or 45, wherein the screen guiding units are disposed to ends of the printing screen in the direction of screen printing.

47. The support system of claim 44 or 45, wherein the screen guiding units are disposed to sides of the printing screen in the direction of screen printing.
48. The support system of any of claims 30 to 47, wherein the clamping mechanism comprises first and second screen clamping units disposed to opposite edges of the printing screen.
49. The support system of claim 48, wherein the screen clamping units are disposed to opposite ends of the printing screen in the direction of screen printing.
50. The support system of claim 48, wherein the screen clamping units are disposed to opposite sides of the printing screen in the direction of screen printing.
51. The support system of any of claims 48 to 50, wherein the screen clamping units comprise elongate units which extend along the respective ones of the edges of the printing screen.
52. The support system of any of claims 48 to 51, wherein the screen clamping units comprise vacuum clamping units.
53. The support system of any of claims 30 to 52, further comprising: a printing screen unit, the printing screen unit including a pattern of apertures through which printing medium is printed onto a workpiece in a printing phase.
54. The support system of claim 53, wherein the printing screen unit includes first and second attachment members attached to opposite edges of the printing screen.

55. The support system of claim 54, wherein the attachment members each extend along a length of the respective edge of the printing screen.
56. The support system of claim 54 or 55, wherein the attachment members are attached to opposite ends of the printing screen in the direction of screen printing.
57. The support system of claim 54 or 55, wherein the attachment members are attached to opposite sides of the printing screen in the direction of screen printing.
58. The support system of any of claims 53 to 57, wherein the printing screen unit includes first and second support elements disposed to opposed edges of the printing screen such as to constrain deflection of the printing screen.
59. The support system of claim 58, wherein the support elements each extend along a length of a respective edge of the printing screen.
60. The support system of claim 58 or 59, wherein the support elements are disposed to opposite ends of the printing screen in the direction of screen printing.
61. The support system of claim 58 or 59, wherein the support elements are disposed to opposite sides of the printing screen in the direction of screen printing.
62. A method of supporting a printing screen unit in a screen printing machine, the method comprising the steps of:
providing a printing screen unit comprising a printing screen including a pattern of printing apertures through which printing medium is printed onto a workpiece;

tensioning the printing screen to a first tension;
printing printing medium onto a workpiece through the pattern of apertures in the printing screen;
tensioning the printing screen to a second tension, which is lower than the first tension; and
separating the printing screen unit from the workpiece.

63. The method of claim 62, wherein the second tension is substantially a zero tension.
64. The method of claim 62 or 63, wherein the tensioning forces are applied to opposite edges of the printing screen.
65. The method of claim 62 or 63, wherein the tensioning forces are applied to adjacent corners of the printing screen.
66. The method of claim 65, wherein the tensioning forces are applied along intersecting axes.
67. The method of claim 66, wherein the axes intersect at a center of the printing screen.
68. The method of claim 62 or 63, wherein the tensioning forces are applied to the respective corners of the printing screen.
69. The method of claim 68, wherein the tensioning forces are applied along intersecting axes.
70. The method of claim 69, wherein the axes intersect at a center of the printing screen.
71. The method of any of claims 62 to 70, further comprising the step of:

- clamping the printing screen in the printing phase so as to fix the lateral, in-plane position of the printing screen.
72. The method of claim 71, wherein the printing screen is clamped at opposite edges thereof.
 73. The method of claim 72, wherein the printing screen is clamped at opposite ends thereof in the direction of screen printing.
 74. The method of claim 72, wherein the printing screen is clamped at opposite sides thereof in the direction of screen printing.
 75. A method of supporting a printing screen unit, comprising the steps of:
providing a printing screen unit, the printing screen unit comprising a printing screen including a pattern of printing apertures through which printing medium is printed onto a workpiece;
clamping the printing screen so as to fix the lateral, in-plane position of the printing screen;
printing printing medium through the pattern of apertures in the printing screen;
releasing the printing screen; and
separating the printing screen unit from the workpiece.
 76. The method of claim 75, further comprising the step of:
tensioning the printing screen to one predetermined tension in a screen printing operation.
 77. The method of claim 75, further comprising the steps of:
tensioning the printing screen to a first tension prior to the step of printing printing medium onto the workpiece; and

tensioning the printing screen to a second tension, which is lower than the first tension, prior to separating the printing screen unit and the workpiece.

78. The method of claim 77, wherein the second tension is substantially a zero tension.
79. The method of any of claims 76 to 78, wherein the tensioning forces are applied to opposite edges of the printing screen.
80. The method of any of claims 76 to 78, wherein the tensioning forces are applied to adjacent corners of the printing screen.
81. The method of claim 80, wherein the tensioning forces are applied along intersecting axes.
82. The method of claim 81, wherein the axes intersect at a center of the printing screen.
83. The method of any of claims 76 to 78, wherein the tensioning forces are applied to the respective corners of the printing screen.
84. The method of claim 83, wherein the tensioning forces are applied along intersecting axes.
85. The method of claim 84, wherein the axes intersect at a center of the printing screen.
86. The method of claim 76, wherein the printing screen unit comprises a screen frame to which the printing screen is tensioned to one predetermined tension.

87. The method of any of claims 75 to 86, wherein the step of clamping the printing screen comprises the step of:
clamping the printing screen at opposite edges of the printing screen.
88. The method of claim 87, wherein the printing screen is clamped at opposite ends in the direction of screen printing.
89. The method of claim 87, wherein the printing screen is clamped at opposite sides in the direction of screen printing.
90. The support system of any of claims 87 to 89, wherein the printing screen is clamped along the respective ones of the edges of the printing screen.
91. A printing screen unit, comprising:
a substantially rectangular printing screen including a pattern of printing apertures through which printing medium is in use printed onto a workpiece; and
attachment means at each of the respective corners of the printing screen for attachment to a tensioning mechanism.
92. The printing screen unit of claim 91, wherein the attachment means each comprise an aperture in the respective corner of the printing screen for attachment to a tensioning mechanism.
93. The printing screen unit of claim 91, wherein the attachment means each comprise an attachment member comprising a reinforcing element attached to the respective corner of the printing screen and a connector element for connection to a tensioning mechanism.
94. The printing screen unit of claim 93, wherein the reinforcing element comprises a plate disposed to one surface of the printing screen.

95. The printing screen unit of claim 93, wherein the reinforcing element comprises first and second plates between which the printing screen is sandwiched.
96. The printing screen unit of any of claims 93 to 95, wherein at least one attachment means defines at least one reference surface for enabling referencing of the position of the printing screen.
97. The printing screen unit of claim 96, wherein the at least one attachment means defines first and second reference surfaces for enabling referencing of the printing screen.
98. The printing screen unit of claim 96, wherein first and second attachment means each define at least one reference surface for enabling referencing of the position of the printing screen.
99. The printing screen unit of claim 98, wherein at least one of the first and second attachment means defines first and second reference surfaces for enabling referencing of the printing screen.
100. The printing screen unit of any of claims 93 to 99, wherein the connector element comprises a rod which is located on a tensioning axis extending through a central region of the printing screen and an enlarged head providing an engagement surface for engaging an attachment member of a tensioning mechanism.
101. The printing screen unit of claim 100, wherein the engagement surface is a part-spherical surface.
102. The printing screen unit of any of claims 93 to 99, wherein the connector element comprises a hook element which defines a recess providing an

engagement surface for engaging an attachment member of a tensioning mechanism.

103. The printing screen unit of claim 102, wherein the engagement surface is a part-cylindrical surface.
104. The printing screen unit of claim 102 or 103, wherein the hook element includes a slot which is located on a tensioning axis extending through a central region of the printing screen and through which a respective attachment member of the tensioning mechanism extends, whereby the hook element defines first and second hook element parts which are in use engaged by the respective attachment member of the tensioning mechanism.
105. The printing screen unit of any of claims 91 to 104, further comprising: first and second support elements disposed to opposite edges of the printing screen such as to constrain deflection of the printing screen.
106. The printing screen unit of claim 105, wherein the support elements each extend along a length of the respective edge of the printing screen.
107. The printing screen unit of claim 105 or 106, wherein the support elements are disposed to opposite ends of the printing screen in the direction of screen printing.
108. The printing screen unit of claim 105 or 106, wherein the support elements are disposed to opposite sides of the printing screen in the direction of screen printing.